



# TYPE I AND TYPE II ERRORS IN TARGETING HEALTH CARE RESOURCES: A CASE OF MEANS TESTING IN SELECTED PUBLIC SECTOR TERTIARY HEALTH FACILITIES IN KERALA, INDIA

Godwin SK PhD

Associate Professor of Economics, Government College for Women, Thiruvananthapuram, Kerala, India.

## ABSTRACT

Developing country health systems are characterized by underfunded health care provision, distorted priorities in resource allocation, weak governance and regulatory structures, sub-optimal policy interventions. The central approach of the reforms has been two-fold: increasing efficiency in resource use and serve equity by excluding the high income groups and include only the poor in all publicly funded actions. The study tries to understand the existing system of means testing in public hospitals in Kerala, India by enquiring on the nature and institutional frame work for means testing as well as the characteristics of the major criteria used to assess means testing. The motivation behind the proposed study comes from the fact out-of-pocket at the point of delivery of care for health care problems prove to be a strong barrier to effective utilization of health care, especially by the resource poor. For the purpose of study, means testing has been defined as 'the criteria, methods and processes involved in classifying them in different gradients of economic and social purchasing power'. The study selected five major public hospitals in Kerala from three districts under Central (Federal) and State (provincial) government ownerships. All institutions have a defined user fee policy suggesting user fees as essential in tertiary care as it increases the compliance of medicines, makes the patients and providers responsible for the use/misuse, ensuring economic sustainability are the major reasons for supporting user fees. All the institutions have a graded pricing system with multiple layers except in provincial government run institutions where only two categories exist while some institutions have five categories. Institutions under the administrative control of the State (provincial) government of Kerala use possession of BPL cards as the sole criterion for categorization with BPL card holders get fully free care compared to full payment by the APL card holders. Despite the fact that these institutions have a declared policy of no patient would be denied of treatment due to inability to pay remains a questionable assurance.

## CONTEXT:

Developing country health systems are characterized by underfunded health care provision, distorted priorities in resource allocation, weak governance and regulatory structures, suboptimal policy interventions. Health sector reforms had been a long pending demand from both within the health system and outside which included health financing reforms (targeting health care resources to the low income segments, expansion of pre-payment schemes including insurance etc), health organization reforms (provider-split in provision including public-private-partnership) and regulatory reforms (progressive public health policies, adequate regulatory and legislation reforms etc). Health financing reforms have been introduced in the Third World Nations (TWNs) during 1980s largely as a component of the general economic reforms. The central approach of the reforms has been two-fold: increasing efficiency in resource use and serve equity by excluding the high income groups and include only the poor in all publicly funded actions. Even international agencies in health including World Health Organizations (WHO) supported the idea of New-Universalism which emphasizes "something for all and all for some". In this context, policy makers and governments in developing countries have increasingly relied on health sector cost recovery as a means of liberating the strain on government budgets and improving health services. With increasing user charges, access to health care of a large low income population raises concerns. It is quite known that out-of-pocket payments dominate the health care financing scenario in low income countries especially in Africa and South Asia. With market friendly reforms in developing economies, they have been under tremendous pressure from plurilateral lending agencies to curtail the limited social spending. This argument comes from at least two inter-related factors: one, the governments need to cut down expenditure to pay for their debts; second, the limited public resources and utilities in low income countries are mostly pocketed by the rich. The second reason brings to force the central issue of limiting the public subsidies only to the low income groups. Thus targeting assumes a development approach of cost-effective poverty reduction rather than an administrative enterprise (Gilson et al 1995). Targeting, thus, tries to guide resources more on to the poor. Fundamentally, the major category of targeting comprises of characteristic targeting or indirect targeting versus direct targeting. The former provide benefits to those having certain broad-spectrum of characteristics of the target population. For instance, it could be geographical, demographic, nutritional status, certain contagious disease carriers etc. Direct targeting tries to narrow down the fruits of a policy or programme to a target group where means testing becomes a natural tool. Means-testing is often suggested as a mechanism to shield the poorest under cost recovery programme by granting fee waivers for individuals who are less capable of paying for goods and services. It provides this safety net for the poorest, while permitting fees to be collected from those with ability to pay, means testing could be an essential tool to promote fee collection and equity simultaneously. The evidence on exemption practices for the poor using means-testing has been not so encouraging. Many governments decreed that poor patients should be exempted from fees at public health facilities. Experience has shown that such exemption by decree was highly ineffective (Willis and Leighton 1995; Gilson 1997; Stierle et al. 1999). As a result of the constrained access to public health providers, many poor households are pushed into sub-optimal health seeking behavior such as foregoing treatment or

using unregulated and often regressive private health care (Russell 1996). This initiates a vicious circle of poverty which is not only brings ill-health, but ill-health also tends to worsen poverty (Whitehead et al. 2001; Wagstaff 2002). The final outcome can be catastrophic, both in terms of health and wealth and leads to asset depletion (Xu et al. 2003). As far the Indian experience is concerned, this is a country where about 80 percent of total healthcare expenditure is paid private out-of-pocket, insurance coverage is one of the lowest in the world, hospitalized Indians spend 58 per cent of their annual expenditure on health care and an estimated 24 percent of them getting impoverished due to costs of treatment, ill health related costs raises concerns about the economic security and welfare of households.

India is in 171<sup>st</sup> position among 175 countries in terms of public spending in health care (WHO 2000). Out-of-pocket payments are a perennial feature of developing country health systems and among developing countries of Asia and Pacific region, India ranks very poorly in terms of public sector involvement in health care delivery and finance. Given the fact that public health care delivery system in India cater to more than 90 percent of all immunization and preventive health care, more than 40 percent of maternal and child healthcare, equal number of institutional deliveries, about 35 percent of all hospitalizations (in-patient care) they assume substantive effect on the life and death of a large population (NSSO 2005). Besides, in order to get hospitalized treatment, public sources of health care form the major option for the lowest income quartiles (ibid). There exist very limited charges in lower health facilities like subcentres, primary health centres, community health centres and higher charges are in existence in secondary (say, taluk, district and general hospitals) and tertiary hospitals (medical/teaching colleges, advanced medical institutions). Currently treatment from public sector is not fully free and is low income population and charges are there in higher level curative care. Though all States are collecting user charges which represent a lower proportion of health sector receipts, different States have got varying administrative structure. The criteria used for classifying poor and non-poor are varying, though there is a Central BPL list in India which is substantially narrow. There are also wide differences in the criteria used to exempt the poor in specialized institutions. Generally, the states of Kerala are reported to have better indicators in the country. The southern State (Province) of Kerala remains well on top in terms of health indicators when compared with the other Indian States (Government of India 2002a). This achievement, often quoted as the 'Kerala Model of Development', was made possible by low cost health care and its universal accessibility and availability even to the poorer sections of society. This achievement, in turn, is largely attributed to the universal availability and efficient functioning of the government health-care delivery system, as competition from government facilities has served as an important factor in determining treatment costs even in private hospitals (Krishnan 1994; Uplekar and George 1994; Government of India 1997; Kunhikannan and Aravindan 2000; Government of India 2002b). The State is also credited with far better availability of health care infrastructure and all villages possess at least one public sector health unit. In Kerala, there are five major teaching hospitals having a total bed capacity of more than 8000 in 2010 and they have a very high share in patient load as majority of them have bed occupancy rates crossing more than 125 percent. The

State also has got a number of super specialty hospitals within the public sector with substantial degree of autonomy in functioning under both the Central and State governments. These hospitals have been given the mandate to collect user charges from patients/users with adequate exemption for the poor. Since the costs of treatment in such institutions are high, they would screen the patients on their economic capability (affordability) to pay for treatment. Means –testing is conducted to assess the patient's economic capability. The study tries to understand the existing system of means testing in public hospitals in Kerala, India by enquiring on the nature and institutional frame work for means testing as well as the characteristics of the major criteria used to assess means testing.

**Conceptual framework** The motivation behind the proposed study comes from the fact out-of-pocket at the point of delivery of care for health care problems prove to be a strong barrier to effective utilization of health care, especially by the resource poor. Means testing, conceptually, helps cost recovery initiatives to achieve their objectives of raising revenues to improve access and quality of health services without hurting goals of equity. However, the success of means testing depends on minimizing errors that may be classified as Type I error and Type II errors. Poor patients who are denied benefits represent Type I errors, also known as errors of exclusion and Type II error, errors of inclusion, occurs when the non-poor receive benefits actually intended for the poor. A perfect method reduces these two type of errors thus minimizing the damage to the health system (Willis & Leighton 1995). A structured review was undertaken using key words viz., health services, cost recovery, means testing, developing countries and public hospitals. Targeting is a policy option of concentrating the benefits of an intervention on a pre-identified specific group (Meessen and Criel 2008), which has been widely applied in programs for reducing poverty, including programs of food subsidies, housing, health care, employment, and education (Imai; Bitrán and Muñoz 2000; Conning and Kevane 2000; Tekleselassie and Johnstone. 2004; Soares and al. 2006; Children's Institute in University of Cape Town December 2005). There is evidence that targeting of public spending in the social sectors can yield better results in terms of enhancing equity than universal provision of services (Bitrán and Muñoz 2000).

**Targeting of public subsidies for health** is one of the central policies available for improving equity in health sector. A variety of methods are available for targeting. Marchione (2005) summarizes four types of targeting methods, including self-targeting, means testing, categorical, and community-base selection. Self-targeting is to use people's own judgments and decisions to distribute targeted benefits; means testing is an administrative mechanism for assessing a person's or a family's eligibility to receive benefits, based on income or other income-related characteristics of an individual or family; categorical targeting usually uses indicators including location of the residence, age, etc; and community-based selection involve community people including community officials and members in decisions of allocating the targeted subsidies. Even though descriptions of the targeting methods are different from authors (Hanson, Worrall et al. 2006; Gwatkin 2000), the key elements of the targeting methods are almost the same. Means testing has been widely used to identify eligible individuals or families in health programs (Levine, Griffin et al. 1992; Willis 1993; Gwatkin 2004). Compared with other targeting methods, means testing was thought of being the most effective and expensive targeting method (Malik and Chanthay 2003). When means testing is used to identify the poor population and improve their use of health services, several steps are involved 1) Identifying the poor people who have no means to access health services; 2) Enrolling people without their own means to access services into health program; and 3) Providing health services for people enrolled in health programs. Aspects of eligibility criteria, targeting mechanisms, implementation process, and administrative costs, are the core elements in a design and implementation of means testing (Levine, Griffin et al. 1992; Willis and Leighton 1995). Criteria for eligibility are often designed according to characteristics of a person or a family in relation to ability to pay for health services. Means tests include three types (Bitrán 2000): simple means test (based on reported household income, size, and composition); sophisticated means test (adjusted family income according to family size, seasonality, costs of major items such as housing, university tuition, major medical expenses); and proxy means test (objectively calculates synthetic needs score or index based on a series of variables that may include housing characteristics and location, family structure, occupation, education, gender of head of household, ownership of durable goods Calculation of index may be done by interviewers or computer). According to Hanson (2006), a range of different types of resource are targeted towards specific groups such as products, services, vouchers, and cash which are subsidized by a government or other public body. Hanson summarizes six different targeting mechanisms that have been applied in the health sector, including resource allocation formulae, contracting NGOs, user fee exemptions, cash transfers, vouchers, and market segmentation strategies.

Means tests can be conducted by local authorities, health provider facilities, health program managers, and community members. Capacity and accountability of the organizers would determine quality of identification of the targets (Jacobs and Price 2005; Rai 2009). In LMICs, availability of information related to the criteria is usually limited, which requires great efforts of people responsible for verifying the eligibilities. In places where means tests are frequently organized, implementation of the means tests may be easier because of better administrative capacity and more basic information than where means testing is initiated for the first time.

**Table 1. Degree of exactness in targeting**

	Poor	Non-poor
Poor	Correctly included beneficiaries	Type II error
Non-poor	Type I error	Correctly excluded applicants

Performance of means testing can be evaluated from two dimensions: two type errors and cost benefit of the targeting. Type I error refers to leakage of the true poor. Type II error refers to coverage of the non-poor. An ideal means testing is to keep the two types errors minimal. However, there is a tradeoff between the two type errors. When type II error is to be reduced, it may increase type I error because some of the true poor could be excluded from a very stringent means test (Willis 1993). As found in Thailand and Chile, high income-eligibility level resulted in high level leakage (Bitrán and Giedion 2006). Means testing is usually expensive if information for assessing the criteria is not available from existing records. More accurate information means more costs. Health program organizers need to consider the tradeoff between accuracy of information and cost for gathering the information (Gwatkin 2004). Proportion of administrative costs of means testing accounting for benefits delivered to the target population can to some extent reflect cost-effectiveness of the means testing. In LMICs, conduct of means testing is more difficult than in developed countries (Levine, Griffin et al. 1992), mainly because in LMICs the population may be sparsely located, infrastructure and information are not available, and much of the population is outside the formal economy. One review on means testing is a published technical note from US Abt Associates Inc. in 1992 (Levine, Griffin et al. 1992). This review aims to synthesize experiences of targeting and means testing in US and developing countries by analyzing 48 cases of projects. Coverage, leakage, and administrative cost of different targeting methods were listed by the authors. The review concludes that although targeting has been done in the health sector, it is more common in food and nutrition programs; because of the data constraints, ability to make comparisons across types of targeting was limited; and there are no standard criteria for "success" of targeting mechanism. Another review conducted by Hanson et al reviewed the evidence regarding different approaches to targeting resources towards the poor. As observed by Hanson, most studies included in the literature just focused on measuring targeting outcomes. In addition, the two reviews focus on general targeting issues rather than means testing. Uncertainty in demand is the classic variable making consumption of health care different from other standard basket of goods. A survey of making the experience of African countries whose health programmes provides descriptive evidence regarding the means testing practice, administrative characteristics, outcomes and environmental and design factors that facilitate means testing. Cost recovery has been more or less compounded by huge administrative costs and the testing mechanism has been rigid. There exists limited amount of literature explaining the issue in the context of India probably because they have not the health care delivery system is functioning fully in a private out-of-pocket context and a public health care system which is more or less fully free at the policy level. In recent times only user fees in public hospitals have gone up at a very high rate raising issues of equity and sustainability.

#### METHODOLOGY:

For the purpose of study, means testing has been defined as "the criteria, methods and processes involved in classifying them in different gradients of economic and social purchasing power". The study selected five major public hospitals in Kerala from three districts under Central (Federal) and State (provincial) government ownerships. They are specialized institutions offering advanced health care interventions which are available otherwise only in specialty private health institutions. A uniform schedule was formulated and circulated across the concerned officials of the selected health care institutions having basic details of the hospital, methodology of means testing, reliance on own sources of revenue, magnitude and proportion of price discrimination etc. The study attempted to understand the characteristics of the targeting mechanism rather than evaluating the accuracy of the methods used. The central reason for such a motivation is that the characteristics of means testing methods would indirectly indicate the possibilities (impossibilities) of targeting.

#### RESULTS:

The selected hospitals are having a bed capacity ranging from 100 and 1800. All institutions are having state-of-the-art technology in the concerned areas of specialization in the given context. It includes MRI and CT scanners, technology intensive operation theaters, specialized laboratory facilities, emergency medicine round the clock with variations, health professionals with post-doctoral and post graduate academic qualifications, teaching facilities on a large scale etc. These institutions have long years of existence with a range of 22 and 61 years. All the selected institutions follow modern (allopathic) system of medicine. These institutions do not have any branches, but some of them have referral and screening units. These institutions recorded substantial increase on the number of patients owing to increasing incidence of certain illness, fastening of social transition, rising incomes and financial protection schemes etc. One institution is having super-specialty disciplines in the field of cardiology and neurology. The second institution is the highest centre of cancer care in the region. The third institution selected is a special medical institution dealing with advanced care for the autistic and other cases with audio-visual disability. The other two institutions are directly controlled by the state government and are referral centers hav-

ing almost all specialty divisions essential for care and support. They charge fees depending on their stature, legislative mandate and autonomy. There exists, primarily, about three categories of patients in these hospitals on the basis of charging fees. They include full paying category, partially paying category and fully exempted categories in these institutions. On average, in the year 2009-10, about 42 percent of patients paid full fees, while 20 percent paid partial charges and 38 percent were exempted from any payment. The latter provide a wider degree of fee waivers than the former. Though all institutions under study are from public sector, institutions under the provincial government uses a simple indicator called Above Poverty Line (APL) and Below Poverty Line (BPL), though substantial efforts went into the making of the simple classification. However, a major problem with this classification is either or approach and dimensions of poverty is complex and so multiple gradation would be essential in order to ensure a fair targeting.

All institutions have a defined user fee policy suggesting user fees as essential in tertiary care as it increases the compliance of medicines, makes the patients and providers responsible for the use/misuse, ensuring economic sustainability are the major reasons for supporting user fees. All the institutions have a graded pricing system with multiple layers except in provincial government run institutions where only two categories exist while some institutions have five categories. Institutions under the administrative control of the State (provincial) government of Kerala use possession of BPL cards as the sole criterion for categorization with BPL card holders get fully free care compared to full payment by the APL card holders. However, these institutions have a long waiting list extending more than 90 days for many elective interventions. The directly operated state owned institutions do not charge anything for emergency care for both poor and non-poor. However, in practice, due to non-availability of medicines bystanders are forced to purchase from private over-the-counter-market for drug and diagnostics. The major criteria used in autonomous institutions are given in the box. The criteria used in distinguishing between the low income groups for targeting are mainly character based and so subjective in nature. Patients with insurance coverage or reimbursement, employment, monthly income above a certain limit, foreign nationals etc are subject to full payment of fees. Patient and by-stander "appearance" constitute a central point influencing categorization. If they appear to be dressed "handsome" with gold ornaments would make them a candidate for being placed in higher fees category. The patients would also be categorized on the basis of the conveyance they use while arriving at the hospital. For example, patient travelling in premium vehicles are normally categorized in higher fee paying category. There exist multiple level checks for correct targeting. Very hardly, the health care institutions studied charge user fees based on an appropriate costing of items. The pricing is mostly set by an internal committee of senior officers of the institutions mostly taking into account private market prices for the selected interventions. The broad based tools by which some autonomously operated institutions use average household monthly income as the prominent indicator for inclusion/exclusion. Besides income, a number of complementary or supplementary factors like perceived nutritional status, level of educational attainments, presence/absence of unemployment, and type of house, type of dress worn, access to electricity, gas connection, etc play significant role. The process in major autonomous public hospitals is detailed below. Income assessment is done by a trained and experienced medical social worker (MSW) from the patients and close relatives.

Gathering of information has both subjective and objective process and is a composite process. It involves observing the patient's and relative's appearance/turnout, type of dress, ornaments they wear etc. They also try to gather details of employment, availability of insurance or reimbursement, extent of landed property, type of house, nutritional level, verification of the income certificate from competent authorities, ration card, possession of automobiles, telephone, mobile phone etc. The information collected would be cross checked with relevant records having which they bring in and other details for assigning them different levels of payments. Though there is no defined policy of limiting the quantum of concessions in different categories, it would not cross a certain proportion in each category based on the consideration of financial sustainability of the institution, proportion of emergencies, waiting list in each category etc. Medical social worker has some degree of discretion to assign categories depending on the circumstances.

#### POLICY IMPLICATIONS:

Despite the fact that these institutions have a declared policy of no patient would be denied of treatment due to inability to pay remains a questionable assurance, The institutions assume an independent and objective assessment of the patient by the identifying official which would be a highly risky assumption in low income settings where a well-functioning governance system is non-existent. The pricing of services, it is stated, is not based on cost incurred, rather randomly done. Though their prices are significantly below the private market for such interventions, a costing exercise of major services would inform them the areas the institutions need to improve in reduction of inefficiencies expansion of certain services, price pattern of different services etc. It is important that policy makers at the provincial and federal level need to have a well-defined policy on targeting which might include which population are to be protected from fees, what services are to be changed and what should not be, volume of services eligible for inclusion and exclusion, preventing of fraudulent practices. In some cases, it becomes costly to exclude people and thus uneconomical. As a principle

of taxation, economy could well be a consideration in case of user fees as well. But the necessary caveats need to be taken into account. The health care delivery system should not charge patients when the patient does not have any opportunity for effective exercise of his/her choice, medical emergencies. Charging in such situations would be substantially damaging for social health from an equity orientation and efficiency perspective. Provision of discretion to the local authority in the hospital has some advantages as it ensures that hardly anyone in genuine need of health care is not denied. However, contemporary evidence suggests, if the exemption mechanisms are implemented under weak governance system as in most low income settings, it is likely to aggravate the Type II error in targeting (excluding a person who should have been provided benefits). One of the feasible options is to have a broader classification of above and below poverty line population so that a higher degree of self-selection would be achieved and administrative cost and corruption reduced. Mean testing is a widely used tool to identify poor population in social or other programs, health sectors also applied it to seek their target groups in different health programs. In this review, most of the target populations were the poor, the indigent, the ultra poor, the poorest, low income families. And some health programs identified their objectives by some other characters such as the physically or mentally handicapped, also exempted are people with particular types of chronic illness (Levine, Griffin et al. 1992), Ultra poor households and labour-constrained household (UNICEF 2007), poorest households that include pregnant women and/or children younger than age 14 (Menotti, Sharma et al. 2008), poor who are neither students nor rural residents (Sine 2003), some government also considered medical needy population such as emergency care users and Specific diseases" treatment such as tuberculosis, leprosy patients, Committed psychiatric patients (Gilson, Russell et al. 1995). Before the policy makers venturing into expansion and sustenance of user fees and exemption schemes, it is imperative on them to exercise greater clarity on a number of issues. For example, the levels of appropriate benefit, the divisions between different groups, (boundaries to be drawn), number of partitions etc. A major limitation of the study is that it reports the outcomes of only a few major institutions and generalization is limited to the extent. Secondly, a patient oriented analysis is essential if we are to identify whether appropriate targeting of benefits happened or otherwise.

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